

improvements to the fuel injectors, which also may help to improve emissions levels.

## Biodiesel

Figure 9 shows the results from the first round of chassis dynamometer tests on five DDC 6V92TA-powered buses run on biodiesel and five run on conventional diesel. The fuel used in the biodiesel buses was a mix of 20% soy biodiesel and 80% conventional diesel fuel. In the initial round of tests, the buses using the biodiesel fuel showed average reductions in CO, total HC, and NO<sub>x</sub> emissions compared to the diesel buses, but the results were mixed from vehicle to vehicle. The differences seen so far are not statistically significant. The average particulate matter emissions seen in this testing was about the same for both diesel and biodiesel buses. Further testing will be conducted, and we will add a second biodiesel site to the program to determine the impact of biodiesel on emissions.

## Other Considerations

All of the alternative fuels except biodiesel add to the curb weight of the bus. Table 7 shows the approximate increase in curb weight of a 40-foot bus as a result of the alternative fuel option.

CNG has the greatest weight penalty because of the weight of the tanks. As tank technology advances, we expect some decrease in this penalty.

Most municipal, state, and federal highways have restrictions on the axle loading that is allowed, to prevent excessive damage to the

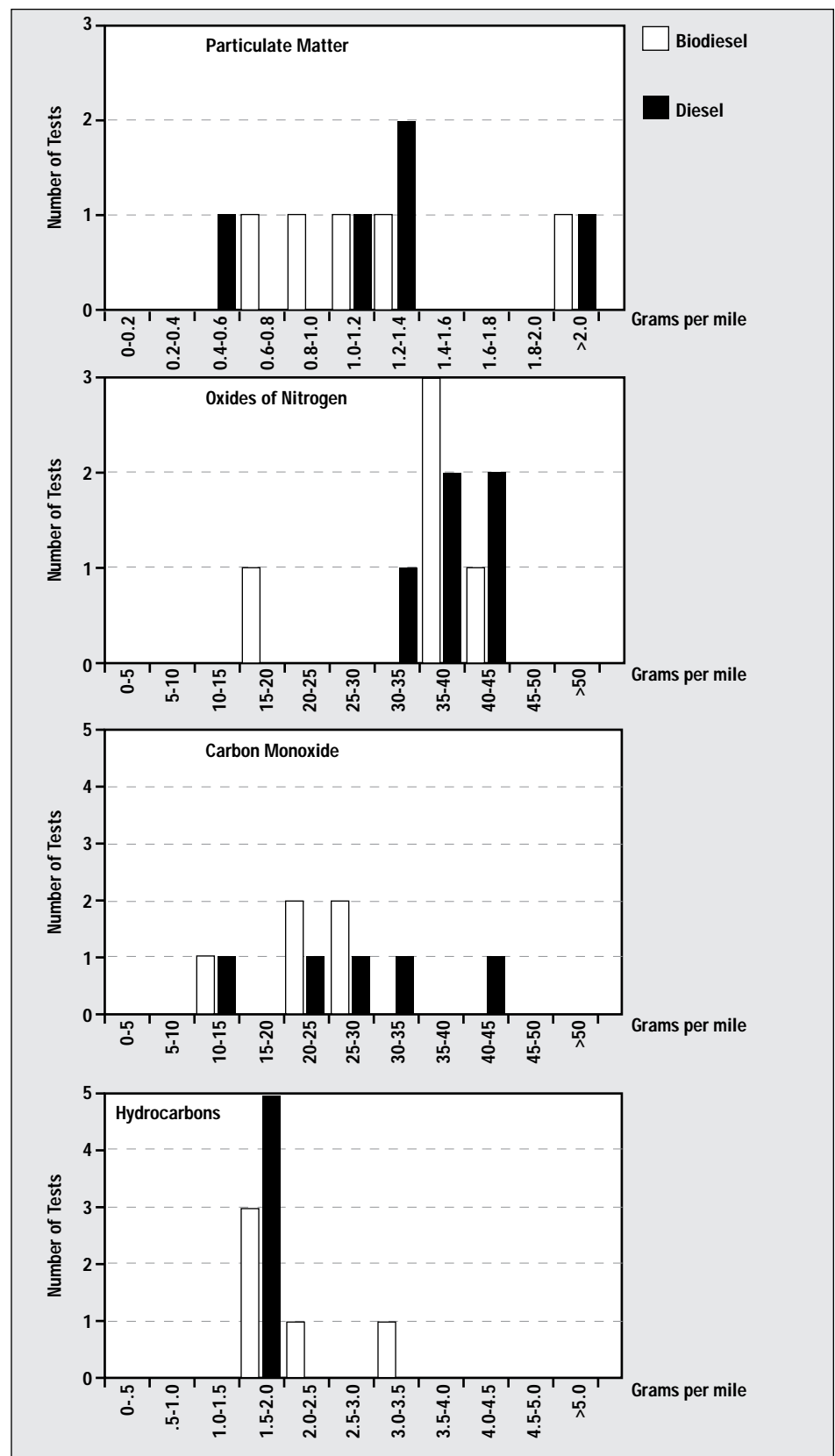


Figure 9. Frequency distribution of emissions from biodiesel and diesel buses

## Alternative Fuel Transit Buses

**Table 7. Approximate Increase in Curb Weight for a 40-foot Transit Bus**

(The curb weight of a diesel bus is approximately 28,000 pounds.)

Alternative Fuel Option	Approximate Increase in Curb Weight (pounds)
LNG	860
CNG	3,900
E95/M100	1,000–1,500
Biodiesel	0

roadway. As a result, the addition of the CNG option often results in a substantial reduction in peak passenger loading, which, if enforced, will restrict the utility of the bus.

The other alternative fuels have substantially lower weight penalties. Biodiesel has none.

### Future Plans

We will continue taking operations data until approximately 18 months of data have been collected from each site. WVU will also continue

emissions testing on the buses in the program once per year. We plan to have at least two sets of emissions tests done on each bus in the program.

Several new sites will also likely be added to the program in the coming year. Among the sites being considered for the program are:

- Corpus Christi, Texas (DDC Series 50 engines, running on propane)
- Portland, Oregon (Cummins L10 engines, running on LNG)
- San Francisco, California (Engines to be determined, running on biodiesel)
- Denver, Colorado (DDC Series 50 engines, running on CNG and propane).

### Numbers, Numbers, Numbers!

Table 8 summarizes the key interim results of the transit bus program.